

NOTICE OF REVISION (NOR) (See MIL-STD-480 for instructions) This revision described below has been authorized for the document listed.		DATE (YYMMDD) 92-01-06	Form Approved OMB No. 0704-0188
Public reporting burden for this collection is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503.			
1. ORIGINATOR NAME AND ADDRESS Defense Electronics Supply Center Dayton, Ohio 45444-5277		2. CAGE CODE 67268	3. NOR NO. 5962-R105-92
		4. CAGE CODE 67268	5. DOCUMENT NO. 85088
6. TITLE OF DOCUMENT MICROCIRCUIT, LINEAR, 1-AMPERE POWER OPERATIONAL AMPLIFIERS, THICK FILM, HYBRID		7. REVISION LETTER (Current) C	(New) D
		8. ECP NO.	
9. CONFIGURATION ITEM (OR SYSTEM) TO WHICH ECP APPLIES ALL			
10. DESCRIPTION OF REVISION Sheet 1: Revisions ltr column; add "D" Revisions description column; add "Changes in accordance with NOR 5962-R105-92". Revisions date column; add "92-01-06". Remove the 5962 prefix on NOR dated 91-11-19.			
11. THIS SECTION FOR GOVERNMENT USE ONLY			
a. CHECK ONE <input checked="" type="checkbox"/> EXISTING DOCUMENT SUPPLEMENTED <input type="checkbox"/> REVISED DOCUMENT MUST BE <input type="checkbox"/> CUSTODIAN OF MASTER DOCUMENT BY THIS NOR MAY BE USED IN RECEIVED BEFORE MANUFACTURER SHALL MAKE ABOVE REVISION AND MANUFACTURE. MAY INCORPORATE THIS CHANGE. FURNISH REVISED DOCUMENT TO:			
b. ACTIVITY AUTHORIZED TO APPROVE CHANGE FOR GOVERNMENT DESC-ECT	SIGNATURE AND TITLE Al Barone Branch Chief	DATE (YYMMDD) 92-01-06	
12. ACTIVITY ACCOMPLISHING REVISION DESC-ECT	REVISION COMPLETED (Signature) Shelly Jenkins	DATE (YYMMDD) 92-01-06	

NOTICE OF REVISION (NOR) (See MIL-STD-480 for instructions) This revision described below has been authorized for the document listed.		DATE (YYMMDD) 91-11-19	Form Approved OMB No. 0704-0188
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1. ORIGINATOR NAME AND ADDRESS Defense Electronics Supply Center Dayton, Ohio 45444-5277		2. CAGE CODE 67268	3. NOR NO. 5962-R058-92
		4. CAGE CODE 67268	5. DOCUMENT NO. 5962-85088
6. TITLE OF DOCUMENT MICROCIRCUIT, LINEAR, 1-AMPERE POWER OPERATIONAL AMPLIFIERS, THICK FILM, HYBRID		7. REVISION LETTER (Current) B	(New) C
		8. ECP NO.	
9. CONFIGURATION ITEM (OR SYSTEM) TO WHICH ECP APPLIES ALL			
10. DESCRIPTION OF REVISION Sheet 1: Revisions ltr column; add "C" Revisions description column; add "Changes in accordance with NOR 5962-R058-92". Revisions date column; add "91-11-19". Sheet 4: Change flange thickness from .100 to .105.			
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b. ACTIVITY AUTHORIZED TO APPROVE CHANGE FOR GOVERNMENT DESC-ECT	SIGNATURE AND TITLE Gregory Lude Branch Chief	DATE (YYMMDD) 91-11-19	
12. ACTIVITY ACCOMPLISHING REVISION DESC-ECT	REVISION COMPLETED (Signature) Shelly Jenkins	DATE (YYMMDD) 91-11-19	

DESC FORM 193-1
SEP 87
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class H hybrid microcircuits to be processed in accordance with MIL-H-38534.

1.2 Part or Identifying Number (PIN). The complete PIN shall be as shown in the following example:

<u>85088</u>	<u>01</u>	<u>Y</u>	<u>X</u>
Drawing number	Device type (See 1.2.1)	Case outline (See 1.2.2)	Lead finish per MIL-H-38534

1.2.1 Device type(s). The device type shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	LH0021	Hi-power operational amplifier (1-amp output) externally compensated

1.2.2 Case outline(s). The case outline shall be as designated in appendix C of MIL-M-38510, and as follows:

<u>Outline letter</u>	<u>Case outline</u>
Y	See figure 1, TO-3 (8-lead can)

1.3 Absolute maximum ratings.

Supply voltage (V_S)	± 18 V dc
Input voltage <u>1/</u>	± 15 V dc
Power dissipation <u>2/</u>	.....	6 W
Differential input voltage	± 30 V
Peak output current <u>3/</u>	.....	2 A
Output short circuit duration <u>4/</u>	.....	(Continuous)
Storage temperature range	.....	-65°C to $+150^\circ\text{C}$
Lead temperature (soldering 10 seconds)	.....	$+300^\circ\text{C}$
Thermal resistance, junction-to-case Θ_{JC}	.....	2°C/W
Thermal resistance, junction-to-ambient Θ_{JA}	.....	25°C/W
Junction temperature	.....	$+150^\circ\text{C}$

1.4 Recommended operating conditions.

Ambient operating temperature range	-55°C to $+125^\circ\text{C}$
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1/ Rating applies for supply voltages above ± 15 V. For supplies less than ± 15 V, rating is equal to supply voltage.

2/ Rating applies at $T_A = +25^\circ\text{C}$ without heat sink.

3/ Rating applies with $R_{SC} = 0\Omega$.

4/ Rating applies as long as package power rating is not exceeded.

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2. APPLICABLE DOCUMENTS

2.1 Government specifications and standard. Unless otherwise specified, the following specifications and standard of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATIONS

MILITARY

- MIL-M-38510 - Microcircuits, General Specification for.
- MIL-H-38534 - Hybrid Microcircuits, General Specification for.

STANDARD

MILITARY

- MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specifications and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-H-38534 and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-H-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

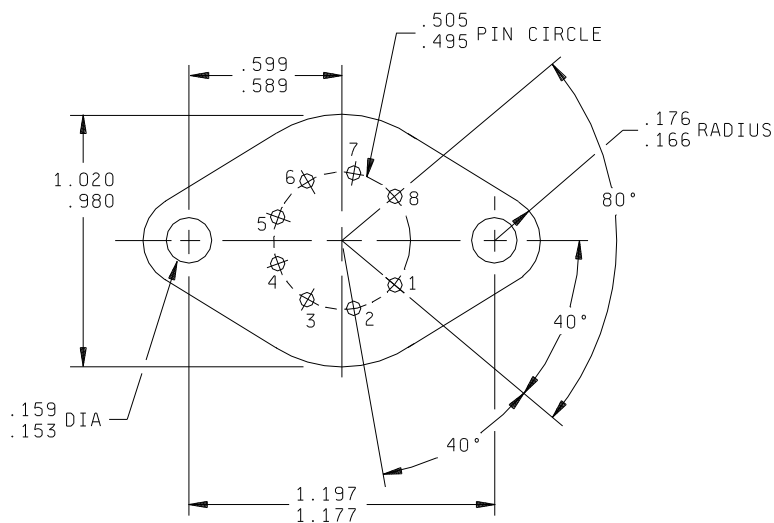
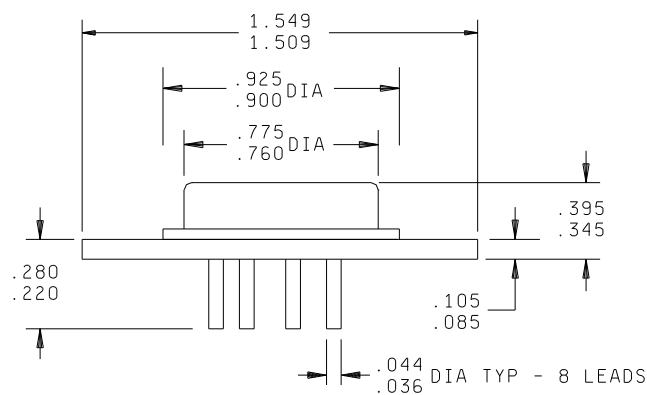
3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full ambient operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 Marking. Marking shall be in accordance with MIL-H-38534. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in QML-38534 (see 6.6 herein).

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Inches	mm
.036	0.92
.044	1.12
.085	2.16
.105	2.67
.153	3.89
.159	4.04
.166	4.22
.176	4.47
.220	5.59
.280	7.11
.345	8.76
.395	10.03
.495	12.57
.505	12.83
.589	14.96
.599	15.22
.760	19.30
.775	19.69
.900	22.86
.925	23.50
.980	24.89
1.020	25.91
1.177	29.90
1.197	30.40
1.509	38.33
1.594	39.35

NOTES:

1. Dimensions are in inches
2. Metric equivalents are given for general information only.

FIGURE 1. Case outline.

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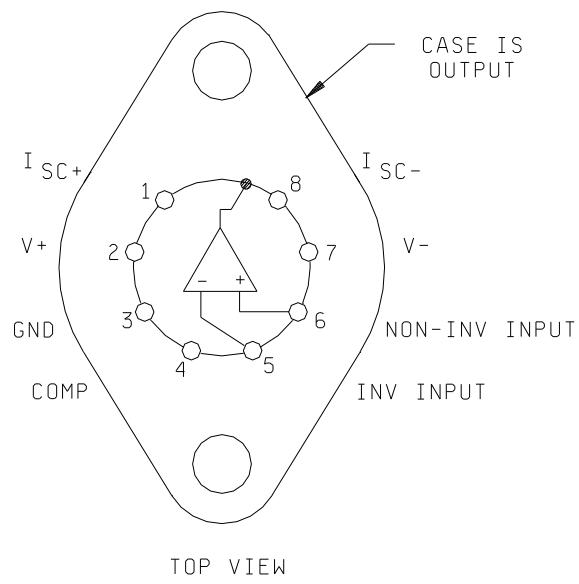


FIGURE 2. Terminal connections.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions ^{1/} -55° C ≤ T _A ≤ +125° C unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Input offset voltage	V _{IO}	R _S ≤ 100Ω <u>2/</u>	1		3	mV
			2, 3		5	
Offset voltage change with output power	ΔV _{IO} /ΔP	ΔV _{IO} /ΔP = V _{IO1} - V _{IO2} <u>3/ 4/</u> ΔP ΔP = 13.5 watts	1, 2, 3		15	μV/W
Input offset current	I _{IO}	<u>2/</u>	1		100	nA
			2, 3		300	
Input bias current	I _{IB}	<u>2/</u>	1		300	nA
			2, 3		1	μA
Input resistance	R _{IN}	T _A = +25° C <u>4/</u>	1	0.3		MΩ
Common mode rejection ratio	CMRR	R _S ≤ 100Ω, V _{CM} = ±10 V	1, 2, 3	70		dB
Input voltage range	V _{INCM}		1, 2, 3	±12		V
Power supply rejection ratio	PSRR	R _S ≤ 100Ω V _S = ±5 V to ±15 V	1, 2, 3	80		dB
Voltage gain <u>5/</u>	A _V	V _O = ±10 V, R _L = 1 kΩ, T _A = 25° C	1	100		V/mV
		V _O = ±10 V, R _L = 100Ω	1, 2, 3	25		
Output voltage swing	V _O	R _L = 100Ω	1, 2, 3	±13.5		V
		R _L = 10Ω, T _A = +25° C	1	±11		

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions ^{1/} $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Output short circuit current	I_{SC}	$T_A = +25^{\circ}\text{C}$, $R_{SC} = 0.5\Omega$	1	0.8	1.6	A
Supply current	I_{CC}	$V_{OUT} = 0\text{ V}$	1, 2, 3		3.5	mA
Power consumption	P_C	$V_{OUT} = 0\text{ V}$ ^{4/}	1, 2, 3		105	mW
Slew rate	SR	$A_V = 1$, $R_L = 100\Omega$, $T_A = +25^{\circ}\text{C}$	4	1.5		V/ μs
Small signal rise or fall time	t_r , t_f	$T_A = +25^{\circ}\text{C}$	9		1	μs
Small signal overshoot		$T_A = +25^{\circ}\text{C}$	4		20	%

^{1/} $V_S = \pm 15\text{ V}$, $C_C = 3,000\text{ pF}$, and unless otherwise specified, connected between pin 4 and case.

^{2/} Specifications apply for $\pm 5\text{ V} \leq V_S \leq \pm 18\text{ V}$.

^{3/} $V_{IO1} = V_{IO}$ at $V_S = \pm 15\text{ V}$, $V_O = 0\text{ V}$, and $I_O = 100\text{ mA}$
 $V_{IO2} = V_{IO}$ at $V_S = \pm 15\text{ V}$, $V_O = 0\text{ V}$, and $I_O = 1\text{ A}$ for 5 ms.

^{4/} Guaranteed if not tested.

^{5/} The part described herein has a "dead band" when V_{OUT} is near zero volts. Typical values for the "dead band" are in the $50\text{ }\mu\text{V}$ to $200\text{ }\mu\text{V}$ range. Open-loop gain is measured at V_{OUT} from $\pm 0.5\text{ V}$ dc to $\pm 10\text{ V}$ dc which is out of the range of the "dead band".

3.6 Manufacturer eligibility. In addition to the general requirements of MIL-H-38534, the manufacturer of the part described herein shall submit for DESC-ECC review and approval electrical test data (variables format) on 22 devices from the initial quality conformance inspection group A lot sample, produced on the certified line, for each device type listed herein. The data should also include a summary of all parameters manually tested, and for those which, if any, are guaranteed.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in QML-38534 (see 6.6 herein). The certificate of compliance submitted to DESC-ECC prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-H-38534 and the requirements herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-H-38534 shall be provided with each lot of microcircuits delivered to this drawing.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-H-38534.

4.2 Screening. Screening shall be in accordance with MIL-H-38534. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.7 herein).

(2) T_A as specified in accordance with method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-H-38534 and as specified herein.

4.3.1 Group A inspection. Group A inspection shall be in accordance with MIL-H-38534 and as follows.

a. Tests shall be as specified in table II herein.

b. Subgroups 5, 6, 7, 8, 10, and 11 shall be omitted.

4.3.2 Group B inspection. Group B inspection shall be in accordance with MIL-H-38534.

4.3.3 Groups C inspection. Group C inspection shall be in accordance with MIL-H-38534 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.7 herein).

(2) T_A as specified in accordance with method 1015 of MIL-STD-883.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection. Group D inspection shall be in accordance with MIL-H-38534.

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5008, group A test table)
Interim electrical parameters	
Final electrical test parameters	1*,2,3,4,9
Group A test requirements	1,2,3,4,9
Group C end-point electrical parameters	1,2,3

* PDA applies to subgroup 1.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for original equipment design applications and logistic support of existing equipment.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-ECC, telephone (513) 296-8527.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-8525.

6.6 Approved sources of supply. Approved sources of supply are listed in QML-38534. Additional sources will be added to QML-38534 as they become available. The vendors listed in QML-38534 have agreed to this drawing and a certificate of compliance (see 3.7 herein) has been submitted to and accepted by DESC-EC.

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STANDARDIZED MILITARY DRAWING SOURCE APPROVAL BULLETIN

DATE: 91-02-06

Approved sources of supply for SMD 85088 are listed below for immediate acquisition only and shall be added to MIL-BUL-103 during the next revision. MIL-BUL-103 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DESC-ECC. This bulletin is superseded by the next dated revision of MIL-BUL-103.

Standardized military drawing PIN	Vendor CAGE number	Vendor similar PIN <u>1/</u>
8508801YX	64762 23223 27014	ELH0021K/E10036 CTS0021ZB LH0021K

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

<u>Vendor CAGE number</u>	<u>Vendor name and address</u>
23223	CTS Microelectronics 1201 Cumberland Avenue West Lafayette, IN 47906
64762	Elantec, Incorporated 1996 Tarob Court Milpitas, CA 95035
27014	National Semiconductor Corporation 2900 Semiconductor Drive Santa Clara, CA 95051

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